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The majority of these are new showers. Amongst the catalogues which I consulted (chiefly Dr. Weiss's collection of Austrian observations, 1867–1874, which contain a very large number for April) there were many short paths and several stationary meteors. It is not surprising that these showers have nearly all of them escaped detection hitherto. They are samples of feeble, long enduring systems with a stationary radiant, and it must be remembered that reductions of this kind have never been undertaken before from such a mass of different materials, which in fact have only recently been published. The durations from April 19 to 23 are of course merely provisional, and I am convinced that a person would get the same radiants from meteors recorded during short periods before and after the dates mentioned. The first shower in the table is already well known as the *Draconids* (No. 64, at 281°+57°, of Mr. Greg's Catalogue, 1876). Of the remainder the next three showers, each giving a sharply defined active radiant, are the best, and appear to be new. I believe they may all be relied upon, and will be verified in time. The one at 294°+41° (slightly preceding δ *Cygni*) I have already confirmed from my own observations this year.

In April there are also many radiants (at present quite unknown) in *Perseus*, *Auriga*, *Cassiopeia*, and bordering constellations, but it is obviously desirable that, inasmuch as the subject is becoming very wide and confused, only the most active and certain showers should be mentioned. Amongst these are positions at 106°+46°, 91°+58°, 80°+74°, 53°+70°, 40°+73°, 130°+79°, indicated by about 10–15 meteors each. Strongly suspected radiants lie at δ *Cassiopeia*, η *Persei*, *p*-*q* and *c* (Bode) *Camelopardi*, β *Geminorum*, &c. This region needs more watching in April.

Ashley Down, Bristol,
May 8, 1878.

Observations of the Transit of Mercury, 1878, *May* 6, *made at the Royal Observatory, Greenwich.*

(*Communicated by the Astronomer Royal.*)

In addition to the instruments belonging to the Royal Observatory, the equatoreals and detached telescopes returned from the Transit of *Venus* expeditions were mounted in preparation for the Transit of *Mercury*. There were thus 14 instruments, of apertures ranging from 12·8 in. to 2·8 in., available, to each of which an observer was assigned; but the Sun was completely hidden by cloud throughout the whole transit, with the exception of a short break about 10^{m} after internal contact, and the following are the only observations which appear worth recording:—

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Great Equatoreal: Aperture 12·8 inches.
Observer: W. H. M. Christie.

The planet was only seen from about $3^h\ 25^m$ to $3^h\ 40^m$ G.M.T., more or less through cloud, though the definition at first was very fine. It was examined with five different powers.

No. 2,	Negative, with neutral tint wedge	126
No. 2,	Negative, with solar diagonal and neutral tint wedge	205
Supplementary A,	Negative, with polarising solar eye-piece (three reflexions) with and without neutral tint wedge	198
Supplementary A,	Negative, with solar diagonal and polarising solar eye-piece	320
No. III.,	Positive, with direct-vision polarising eye-piece with and without a diaphragm, giving a field of about three times diameter of *Mercury*	133

The solar diagonal was provided with a Barlow lens, so as to lengthen the focus.

1. A minute bright spot was seen with all these eye-pieces very near the centre of the planet's disk. It was slightly diffused, but with a brilliant starlike nucleus. As far as I could judge, it did not shift its relative position with the place of *Mercury* in the field of view, but I did not test this for extreme positions, being occupied with the scrutiny of the planet and its neighbourhood during the short time available. In the course of the observations, however, the position of the planet in the field of view was changed repeatedly. The bright spot was only seen when the eye-piece was carefully adjusted to focus, and the definition good as tested by the distinctness of the "rice grains" on the Sun. The spot was central, as nearly as I could estimate; if anything it appeared slightly on the side away from the point of contact, but I could not make sure of this.

2. A bright halo of somewhat irregular outline, and having a breadth of $3''$ to $4''$ was seen round the planet with an inner and much brighter ring about $1''$ in breadth. The halo was much brighter than the ordinary surface of the Sun. It may have been an effect of contrast. It was best seen when the light was reduced to extreme faintness by turning the Nicol of the direct-vision solar eye-piece. The inner and brighter ring was only seen with this eye-piece. No effect on it or on the bright spot seemed to be produced by the diaphragm limiting the field of view to about $40''$, but clouds obscured the Sun before I could do much with the diaphragm.

Simms' Equatoreal, No. II.: Aperture 6 inches.
Observer: E. Dunkin.

At the time of external and internal contacts the sky near the Sun was densely cloudy. A few minutes after internal contact,

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about 3^h 25^m M.T., a break in the clouds, which had been gradually coming up from the S.W., reached the Sun, and from that time till about 3^h 42^m M.T., *Mercury* was generally visible on the Sun, and occasionally seen free from cloud. A negative eye-piece, giving a power of 150, was used, with a solar diagonal and neutral tint wedge.

When first observed *Mercury* had advanced some distance from the Sun's limb, but was still partly obscured by clouds. These gradually cleared away, when both the Sun and planet were seen superbly defined; in fact, I can scarcely remember seeing a better definition of the granular surface of the Sun. *Mercury* was intensely black, except that I saw distinctly, for about a quarter of a minute, a very minute point of light near the centre, a little towards the following limb of the planet. There could, I think, be no doubt of this phenomenon, though the spot was not continuously visible during my examination. After an interval of two minutes the point of light became more vividly distinct than before. The passing clouds, becoming denser, prevented any further observations.

During the few minutes of superb definition, the ring, or corona of light, noticed around *Mercury* at the transit in 1868, was clearly visible, its breadth being about one-third that of the planet. To my eye, this corona was evidently fainter than the Sun, and appeared with radiating arms as in the solar corona. Looking at the intensely black disk of *Mercury*, in conjunction with the bright surface of the Sun, the halo of light seemed to be of a half-tint, and my impression at the time was that this ring of apparently subdued light was probably produced only by contrast. The halo was perfectly uniform around the planet. I had prepared to examine both the corona and the luminous point on *Mercury* with various powers, but before I could re-focus the instrument, using a higher power, the clouds became too dense to continue the observations.

Equatoreal by T. Cooke: Aperture 6 inches.
Observer: Captain G. L. Tupman.

After the ingress the Sun was almost, if not entirely, free from clouds for fifteen or twenty minutes, although never free from a thin white haze. The definition was not nearly so good as it had been during the week previous. There was a good deal of "boiling." I scrutinised the planet most diligently with powers of 110, 140, and 240, with and without the solar diagonal, using when necessary an achromatised wedge of bluish neutral tint glass. I could not detect the slightest trace of a permanent white spot within the disk. Occasionally there was a faint white diffused light over parts of the planet's disk, but it was not permanent, appeared in different parts, and sometimes on both sides of the centre.

I could not detect any ring, either luminous or shadowy,

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surrounding the planet. I was struck with the extreme sharpness of the planet's outline.

I was prepared to take measures with the double-image micrometer, but the planet was too far on when first seen to measure its position, and the clouds generally made such observations impossible.

Hodgson Refractor: Aperture 6 inches.
Observer: G. S. Criswick.

The Sun at the time of ingress was completely hidden by clouds, and did not become visible till the planet was well advanced on the Sun's disk. I then noticed that *Mercury* appeared to be surrounded by a ring of light equal in breadth to about two-thirds of the diameter of the planet, irregularly defined, rather fainter and whiter than the light of the Sun. As I continued to watch the planet, this ring seemed sensibly to contract in breadth, and to completely disappear as the image of the Sun became less bright from passing clouds. Two bright spots were also seen on *Mercury*, one, the fainter, nearly, but not quite, in the centre of the black disk, a little to the right or eastward; the other, and brighter, being nearer to the upper limb. These spots were not always visible to me, and I thought that they appeared sometimes slightly to shift their position with respect to the disk of the planet, but not *inter se*.

I am inclined to think that the ring of light seen round the planet was, as it appeared to me, merely the effect of contrast, as it was not visible during the later half of the time that the Sun was visible.

With regard to the two bright spots, except that they were certainly there, the shortness of the time available, and the more or less cloud about, prevented my having any opinion.

After the clouds had so obscured the Sun that it was impossible to say whether it was in the field or not, *Mercury* was most distinctly visible.

The telescope used was the "Hodgson," with a solar diagonal eye-piece, and a power of 180.

Sheepshanks' Equatoreal: 6·7 in. Aperture. Power 70, Negative Eye-piece. *Observer*: A. W. Downing.

The planet was not seen till quite on the Sun. An appearance of a ring slightly brighter than the Sun was visible round the planet, but no bright spot could be seen with this eye-piece.

Tried a negative eye-piece of power 140, and the existence of a spot was *suspected*, but the definition was not good with this power. The sky was more or less cloudy all the time, and a careful examination could not be made.

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Simms' Equatoreal, No. II., and Lee Equatoreal: Aperture 6 inches.
Observer: W. G. Thackeray.

Neither the Sun nor *Mercury* was visible, on account of the clouds, till about ten minutes after the time of ingress. On looking at *Mercury* through the telescope used by Mr. Dunkin it had a uniformly dark appearance, but after a minute or two I saw a confused patch of light in the middle of the planet, which appeared to vary in size and brightness according as the Sun was more or less obscured by clouds, and left me under the impression that the light was due to contrast. I afterwards looked through the telescope used by Captain Browne (Lee Equatoreal); *Mercury* then appeared of a uniformly dark colour, but by this time the clouds had become much thicker, and the Sun's limb was very faint. When the Sun was no longer visible *Mercury* could be seen in the telescope, and then the centre appeared the darkest.

Detached Telescope, Simms No. I.: Aperture 6 inches.
Observer: W. C. Nash.

No observations made at ingress. Sky cloudy.

About 3^h 28^m *Mercury* was seen on the Sun's disk, and for a time afterwards.

With telescope, Simms No. I., using powers 145 and 240, I carefully examined the planet, but could detect no signs of a ring surrounding it, or of a bright spot upon its disk.

Later on, I examined *Mercury* under favourable circumstances with the Lee Equatoreal, but could not detect a bright spot.

With the photoheliograph three photographs were obtained by Mr. Maunder on wet plates, which seem to show some traces of a bright halo round *Mercury*. A number of dry plates had been prepared by the tea process, but there was no opportunity for exposing them.

Royal Observatory, Greenwich,
1878, *May* 8.

Other Observations of the Transit of Mercury, May 6, 1878.

Mr. Brett writes:—

"A part of the transit was observed by me, and by Mr. Walter Pye, and by my assistant observer, at my Observatory near Putney.

"The contacts were hidden by an impenetrable mist.

"The planet was first seen after it had passed within the Sun's